

WILLINGNESS TO PAY FOR REINDEER MEAT ATTRIBUTES:

A NICHE MARKET STUDY IN INTERIOR ALASKA

By

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Abstract

The Alaskan market for reindeer meat is unique. This study's aim is to estimate the average consumer willingness to pay for a range of reindeer meat attributes. These attributes include those that have a direct impact on meat quality such as cut and fat percentage, as well as intangible qualities, such as where the meat is grown and by whom it was raised. The study focuses on the preferences of people in Interior Alaska, specifically the Fairbanks Northstar Borough. The Reindeer Act of 1937 and supply infrastructure limitations have both contributed to a low level of reindeer meat production in Alaska. This study uses an adaptive choice-based conjoint to measure what attributes participants find most important and estimate how much they are willing to pay for those reindeer meat attributes.

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Chapter 1: Introduction to the Reindeer Meat Market in Alaska

The State of Alaska provides a number of distinctive food consumption opportunities that are uncommon elsewhere. As just one example of such an opportunity a number of Alaskans produce and consume reindeer meat. Owing to a lack of supply infrastructure and limited awareness the market for reindeer meat in Alaska remains narrow. Reindeer are classified as *Rangifer tarandus*, a species of deer that also includes caribou. However, reindeer are domesticated livestock in contrast to caribou. Caribou are native to arctic, subarctic, tundra, and mountainous regions in North America and Europe, while reindeer were initially brought to Alaska from Siberia (Bucki, 2004). This thesis aims to estimate willingness to pay for each of these attributes and find dominant attributes amongst these. This study will employ the use of an Adaptive Choice Based Conjoint in the form of an online choice experiment to observe what value respondents from interior Alaska place on different attributes of reindeer meat. The analysis will provide an insight into what kind of potential market there may be for developing reindeer meat for commercial sale.

The market for reindeer meat is known as a “niche market,” meaning that it is a type of specialty market, but not in the typical sense. There is not currently a large market for reindeer and obtaining reindeer meat typically requires a specialty order anywhere outside of the State of Alaska. Normally niche markets develop from a specialized demand for a product, but with reindeer meat, the limitation in market extent is due to the supply constraints. While many Alaskans make a living herding reindeer, who can legally herd which kind of reindeer is determined by the Reindeer Act of 1937. While the act does not limit who can herd reindeer originating from Canada it does limit the herding of reindeer originating from Alaska to Alaska Natives. This approach to policy was designed as a way to expand economic development

opportunities for Alaskan Natives. Reindeer herding and farming is an important source of livelihood for many Alaskan residents.

Efforts to expand the market for reindeer meat reindeer is part of a larger effort in Alaska to increase “Alaska Grown” food as a means of improving food security and promoting economic development. With more connectivity to the contiguous United States, it is easier for producers from other states to gain market share in Alaska. This is mainly seen in Anchorage, Mat-Su, and Fairbanks, the population centers of the state. The Alaska Grown movement puts emphasis on supporting traditional subsistence and local grown lifestyle that many Alaskans tend to prefer, rather than supporting outside producers.

Alaska Grown is a state sponsored program, by the State of Alaska’s Department of Natural Resources (DNR). The goal behind this program is to increase overall awareness amongst consumers towards the consumption of agricultural based products that are locally grown in the State of Alaska. The label for Alaska Grown is not at all an indicator of food quality or any other sort of actual measures other than the general policy which allows the use of the logo on “quality local products that meet the established grade standards for the top two grades for the particular item” (Alaska Department of Natural Resources, 2013). The other qualifying factor for the Alaska Grown program is that the end product be 100% locally grown for most products, except for processed food items, which must be 75% local. The Alaska Grown logo has become a common sight in many grocery stores across the state, signaling a relatively successful campaign by the DNR to increase consumer awareness. Alaska Grown is becoming more of a household phrase, indicating that there is a general culture of consumers seeing out these locally grown products. The campaign also signals a sense of pride in things that are “more Alaskan.” People often refer to themselves as Alaska Grown, meaning that they were born and raised in the

state. You can also find Alaska Grown apparel, with the official DNR Alaska Grown seal on it. There may be value in understanding how much of the extra willingness to pay by Alaskans is connected to the assurance that Native Alaskans or Alaska residents in general are receiving economic benefit.

The market for Alaskan reindeer meat is largely uncontested. Because Alaska is geographically separated from the contiguous United States, most of the food consumed in the state has to be shipped in via plane or boat. When it comes to harvesting reindeer meat, there is no other location in the United States where reindeer meat is produced for public sale. The primary competition for supplying reindeer meat comes from Canada, with additional supply coming from areas such as Siberia and Scandinavia. However, these supplies are limited and do not present significant competition to Alaskan producers. Instead, the extreme climate, low population density, and limited access to road infrastructure creates difficulties for reindeer meat suppliers. Additionally there is not an established USDA certified processing facility available. This further constrains reindeer meat supplies and dampens market activity.

The methods for raising reindeer meat have a lot of impact on the end-product, similar to other domesticated meat products. There has been more attention placed on what goes into the food that people are eating and, with the information age, people have much more awareness about the food they eat. This means that the price people are willing to pay for food products is no longer just based on the appearance of the food in the grocery store, but the additional attributes that are featured in promotions of the product. These attributes can range from the pesticides and antibiotics used to Fair Trade and the humane practices in product production. Simply, products associated with desirable attributes, such as organic, hormone free, or free range, may receive a price premium. People are gaining additional utility from these attributes

related to perceived health benefits and ethical aspects associated with food products in addition to traditional food qualities directly related to taste and appearance. This same logic is applicable to Alaska Grown products. Instead of people gaining additional utility from the moral compass by making sure poor coffee farmers in Vietnam are getting a livable wage, consumers gain extra utility from their sense of community, as well as tangible utility by increasing the amount of money that is staying in the local economy (Brown, 2003; Carpio & Isengildina-Massa, 2008).

Chapter 2: Background and Literature Review

Generally, when there is this notion of locally grown, consumers are often left to figure for themselves what they believe local is and what attributes are inherent to local produce (Adalja, Hanson, Towe, & Tselepidakis, 2015). When consumers figure out what attributes they perceive to be associated with locally grown produce, they are largely thinking of positive attributes (Adalja et al., 2015). Additionally, there is a shift in willingness to pay based off of a perceived factor of freshness, health benefits, environmental sustainability, and how much the product actually supports and benefits the local economy. Alaska overcomes the problem of consumer misunderstanding of locally grown because the Alaska Grown program is directly regulated by the state and has actual guidelines on what can and cannot bear the official program seal. This provides a structured certification process that is lacking in some other states, leaving local producers subject to consumer interpretation, perceptions, and potential misuse by competitors of the locally grown branding (Adalja et al., 2015).

With the recent spotlight being put on obesity and other diet related illnesses, there is a higher demand for a better, healthier food product in the grocery store. The consumer's perspective is that something locally grown is healthier and has less of the additives that have been contributing to the obesity issue (Reynolds-Allie & Fields, 2011). This relates back to the idea that people have some intrinsic idea that locally grown is fresher, healthier, and of higher quality. There is inherently a more active lifestyle amongst Alaskans, with subsistence living being a part of the normal lifestyle. The culture of Alaska is conducive to tighter knit local communities since Alaska lacks large cities. The major population areas in the state are found in the Anchorage and Mat-Su region, near the southern coast, and Fairbanks, which is in the interior. These areas host and support farmer's markets where local producers sell their goods.

Alaska is not an exception to the recent trend in the growth of farmers markets. Within the United States, farmer's markets have increased by 150% since the mid 1990's (Reynolds-Allie et al., 2011). This indicates that not only has the locally grown movement been popular across the entire United States, but also that Alaska is picking a good time for promoting the Alaska Grown concept. In a typical farmer's market setting, producers can increase returns by 80%, versus when they sell wholesale to distributors (Henneberry et al., 2008).

During the 1970s and 80s, reindeer populations in Alaska fluctuated naturally from as low as 25,000, up to 50,000, with approximately 30-40% of the population residing on the Seward Peninsula. Recently, population numbers estimate the number of reindeer as low as 15,000 in 2007, with the majority of them being on the Seward Peninsula. (USDA, 2008). The current issue that is being faced with many reindeer herders is that their reindeer are being absorbed into migrating caribou herds that expanded their migration routes onto the Seward Peninsula. Currently, there are an estimated 30 distinct caribou herds in the state. While, at their essence, reindeer and caribou are scientifically classified the same, the reality is that the modern day reindeer cannot compete with the Caribou and eventually do not last long with them (Bartlett, 2003; Christie & Finstad, 2009).

Unlike cattle, reindeer are not mass farmed and not subject to modern breeding practices that ensure a stable level of livestock. This approach produces both positives and negatives. The positives come from the idea mentioned about consumers associating positive attributes with food being locally grown. Alaska Grown reindeer, with some exemptions, is typically farmed by Native Alaskans. Canadian reindeer, while not originally Alaskan livestock, also produce revenue for Alaskan residents and move money in the local economy. Consumers can have that extra level of confidence regarding the quality of reindeer meat they are getting when it is

certified Alaska Grown because, of the nature of the industry in Alaska (Christie et al., 2009). These are traits that are valuable to the informed consumer. Therefore, there is some reason to believe that willingness to pay for reindeer meat could be positively affected by the fact that an Alaska Native raised the animal. Since most reindeer are raised on smaller farms, rather than giant automated farms, there are lower economies of scale and generally much smaller operations. Producers find themselves avoiding a lot of the challenges usually faced by producers in a niche market, such as seasonal trends, finding a location, competing with larger farmers, etc. (Griffin & Frongillo, 2003).

The individual consumers may not usually be aware of the supply chain for their food, but with the higher levels of transparency in the Alaskan market, the process by which food gets from farm to table may carry more significance to an individual consumer. Consumers feel they hold more leverage in their product choice when there is an increased amount of transparency, thus increasing their willingness to buy. The willingness to buy is similar to willingness to pay, but rather where a consumer will commit to actually making a purchase. The willingness to buy is a foundation for developing a willingness to pay and the more likely consumer are to buy reindeer meat, the more significant the other attributes the economic question will be when affecting how much an individual consumer is willing to pay for a given product, in this case reindeer meat (Egels-Zandén & Hansson, 2015).

Judging willingness to pay in niche markets has unique challenges due to the unique structure that exists. Niche markets are typically defined by a limited geographic area, consumer type, availability, etc. The niche market that exists in the reindeer meat market in Alaska is also unique because it is only a subset of the Alaska food market, extremely limited by availability and secluded by geography. In 2009, with respect to the population centers of Alaska, only 5%

of Alaska's food supply was produced by Alaskans, leaving many residents to be sensitive to, not only transparency in their supply chain, but origin of the supply. Typically niche markets have a more inelastic demand structure, however, the Alaskan economy provides a very unique situation where consumers may be more price sensitive because of the issue with massive amounts of uncertainty in food supplies (Martin & Hill, 2009). While Native Alaskans have exclusive rights to farming Alaska originating reindeer meat, the herding practices are largely in Southwestern Alaskan and the Seward Peninsula. Within the Native Alaskan population, individuals express more support to purchase products from within that population, but there is still the price sensitivity that arises from selling niche products in a market that does not have a lot of wealth (Christie & Finstad, 2009; Martin & Hill, 2009).

Previous studies in developing willingness to pay metrics have used adaptive choice based conjoint studies to account for the varying levels of price sensitivity and the unique interactions between attributes for specific consumers. This is highly effective for marketing in niche markets because there is the ability to overcome, to some extent, the limited available sample size. With the varying populations in Alaska, the sparse population, and the uniqueness of the reindeer meat market, it would fit well (Green & Srinivasan, 1990). There is a high level of segmentation that occurs when consumers consider all the available information and they make their purchase decisions. There are multiple levels of bias, utility payout, ethical and moral considerations, preferences that may effectively establish every consumer as having a set of preferences unique to every other consumer, if operating in a smaller niche market. Residents of Colorado had the opportunity to evaluate their ideal purchasing options when looking at "Colorado Grown," organic, non-GMO products, which largely fell into the realm of niche

markets. Residents in Colorado tended to value niche market products being Colorado Grown more than if they are certified organic or non-GMO qualities (Loureiro & Hine, 2015).

Market valuation for locally grown of organic labeling is often very difficult to fully assess. However, each market area will have a different sense of valuation towards their specific region that they are from. Alaska Grown has not been fully assessed regarding the effectiveness on consumer willingness to pay for specific Alaskan goods, as far as difference in differencing methodology is concerned, but there is the comparison to willingness to pay for the Alaska Grown label vs the USDA certified organic label. In general, consumers are more willing to pay for the labels, respectively (Loureiro & McCluskey, 2000).

Chapter 3: Data Collection

Understanding the factors that drive consumer willingness to pay (WTP) for different attributes can be valuable for marketing professionals. There is a diverse array of approaches available for determining WTP. The most direct method has been experimental auctions, but these are difficult to get a robust population sample and realistically execute within budget constraints. This has lent way to hedonic modeling and Choice-Based Conjoint Analysis. As far as marketing is concerned, Choice-Based Conjoint Analysis is the more popular method being used (Green & Srinivasan, 1990).

The focus of this project is to establish the willingness to pay for specific reindeer meat attributes that can serve as a starting point in determining those physical and intangible qualities Alaskans desire. The reindeer meat attributes were chosen to capture certain elements cited in other willingness to pay studies that may be relevant to the unique setting of the Alaskan reindeer meat market (Adalja et al., 2015; Carpoi, et al., 2008; Loureiro et al., 2000; Loureiro & et al., 2002). The specific attributes that are included in this study are:

- 1.) Price per pound
- 2.) Alaskan vs. Canadian origin
- 3.) USDA certified organic
- 4.) Animal raised by Alaskan Native, Canadian First Nations, Inuit, or Métis peoples
- 5.) Cut of reindeer meat
- 6.) Lean: Fat ratio

Each attribute is mean to measure a direct preference amongst consumers, but may also have an indirect measurement as well. Price per pound is a linear variable, where the prices range from \$8/lb to \$24/lb. This was established by using typical price ranges for venison markets. The

price range is used to establish the baseline for the willingness to pay for different variable combinations (MacMillan & Phillip, 2010). The Alaskan vs. Canadian origin reindeer is meant to extrapolate a sense of preference for Alaska Grown. The idea is that if a person has a preference for Alaska Grown, then they should choose Alaskan origin reindeer meat over Canadian origin reindeer meat at various prices to some individual threshold point that will vary from person to person.

USDA organic certification and the lean: fat ratio are physical attributes of reindeer meat that measure individual preferences for these tangible attributes. What cut of meat is chosen is expected to be primarily based on the consumer's specific preferences, however the lean: fat ratio serves a dual purpose. Some people would associate a cut of red meat's fat content with its juiciness and tenderness. Typically, very lean cuts of meat are easily dried out when cooked and therefore less tender and juicy. Accordingly, some people will prefer fattier cuts. However, lean cuts have the benefit of being a healthier option. So, the lean: fat ratio implicitly measures the individual's preference regarding the juiciness or tenderness vs healthiness tradeoff. The meat leanness will be evaluated at 80%, 85%, 90%, and 93% lean levels, which are the typical options found for comparable meat sources commercially sold.

The method for data collection chosen is a digital survey tool administered online. The survey is set up as a choice experiment, designed as an Adaptive Choice-Based Conjoint (ACBC). This method for data collection was selected due to the unique problem presented with studying a small, unique, niche market. There is anticipation for a smaller population sample size available, as well as a high level of potential segmenting in the different preferences and demographic backgrounds amongst consumers. Many of the potential participants are a varied mix of transient populations, income, Alaskan status, Native Alaskan status, etc. Additional

explanatory variables will also be recorded through demographic information. The background variables being controlled for are sex, several variables to assess the extent of an individual connection to Alaska, whether the individual is part of a regular transient population (university students, military), if the student is of Native Canadian, or Native Alaskan descent, income levels, and age. The participants also answer questions regarding their level of experience with reindeer, caribou, and fish and game in general. This is done in order to ascertain the potential for informed bias by those more involved with the reindeer meat process than the less informed, consumer.

The overall format for the data collection is a two tier, stratified collection effort in the following sequence:

- 1.) Fairbanks MSA population sample
- 2.) University of Alaska Fairbanks student population

For the purpose of the pilot group, the survey was distributed in three online sections of undergraduate economics courses at the University of Alaska Fairbanks. During the live survey, recruitment was sent to 750 local residents in the Fairbanks MSA. These mailings were limited to the Fairbanks proper and College areas in order to avoid a re-sampling of rural areas that has been previously solicited for participation in another department research project. This creates a slight bias towards those living within the “city area” of Fairbanks.

The second phase of survey recruitment was done digitally, by e-mailing recruitment notices through independent school list serves within the University of Alaska Fairbanks. UAF does not maintain a central undergraduate list serve, therefore each school was independently recruited. The schools solicited were: College of Liberal Arts, School of Management, College of Natural Sciences and Mathematics, School of Natural Resources and Extension, and the

College of Rural Development. Additionally, the Graduate School was also recruited, which provided access to the centrally maintained graduate student listserv. Data was collected to differentiate what school different respondents were from, so all student respondents are grouped as either undergraduate students or graduate students, all others are non-university respondents and presumed to be a part of the local population. Overall, 114 completed responses were used for the study.

Table 1: Summary of demographic variables observed for choice experiment participants

Traditional Variable	Direction of Correlation and Reasoning	Measured Variable
Age	There may be some correlation between a person's age and their willingness to pay for certain attributes based on cultural changes, such as organic certification, health awareness, etc. However, there may also be some double counting towards a person's price sensitivity based on household size and income. Typically, age may be correlated with both of these variable.	Age Range: <ul style="list-style-type: none"> • 18-24 • 25-34 • 35-44 • 45-54 • 55-64 • 65 and older
Sex	This is in the event that there is some difference in observed utility between males and females	Female (Dummy Variable)
Transient Persons	Those who are temporarily in the state due to work or education will have less investment in the local market and therefore lower willingness to pay for Alaskan grown product..	<u>University Level:</u> <ul style="list-style-type: none"> • Undergraduate • Graduate • No University Affiliation Active Duty Military Household (Dummy Variable)
Alaskan Status	It is expected that those that have lived in Alaska longer or were born in Alaska have more ties to the state and therefore would be more willing to pay for Alaska Grown products.	Born in Alaska (Dummy Variable) Time in Alaska (in years): <ul style="list-style-type: none"> • 1 • 2 • 3 • 4 • 5 • 6+ Intent to Stay in Alaska <ul style="list-style-type: none"> • Yes • No • Unsure
Native Alaskans	Due to the Reindeer Act, Native Alaskans are the sole beneficiary of rights to own Alaska reindeer and therefore would be willing to pay more for Native Alaskan produced reindeer, which is also Alaska Grown.	Native Alaskan (Dummy Variable) Aboriginal Canadian (Dummy Variable)

Table 1 continued

Hunting Experience	Those with more hunting experience may have a more preferable view of untraditional livestock attributes.	Hunting Frequency Range, based on level of frequency and dependence
Reindeer Farming Involvement	Reindeer producers would be more likely to support locally produced reindeer.	Reindeer Herders (Dummy Variable)

Limitations and Potential Selection Biases

There was an inherent difficulty in getting an appropriate amount of responses to the survey effort. This difficulty was attributed to a couple of primary possible reasons and potential biases to account for in the data. First, Alaska is a sparsely populated state, the City of Fairbanks has an estimated population of 31,535 (U.S. Census Bureau, 2010). Additionally, some residents may not have home internet connections and therefore could be excluded from participating in the online survey. Due to the challenges in garnishing responses from the local community through traditional mailer invitations, responses were augmented by including the UAF student population. This carries the potential to proportionally oversample from a younger, more educated pool of participants. Additionally, the online platform of the adaptive choice survey may be more appealing to a younger demographic and lead to a higher participation rate from younger individuals. This also opened the survey up to a more transient population, as it is expected that many university students are transient residents of FNSB, residing there for education purposes. However, UAF has a large population of local and otherwise in-state students who do have residency status and a comparable investment in the local community as non-student residents. This is shown by the number of survey participants that were in Alaska for 6 or more years (73%). The number of in-state students at UAF was considered to outweigh any potential bias from “outsiders” taking part in the survey who are not invested in the local Alaskan markets.

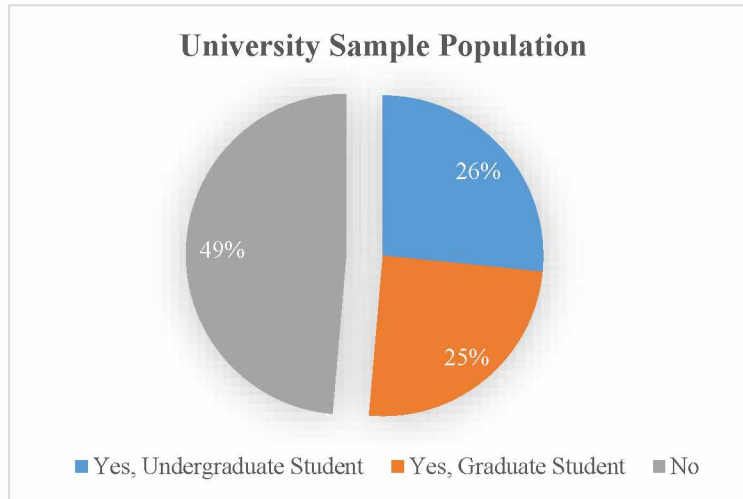


Figure 1 Distribution of participants based on student status at the University of Alaska Fairbanks

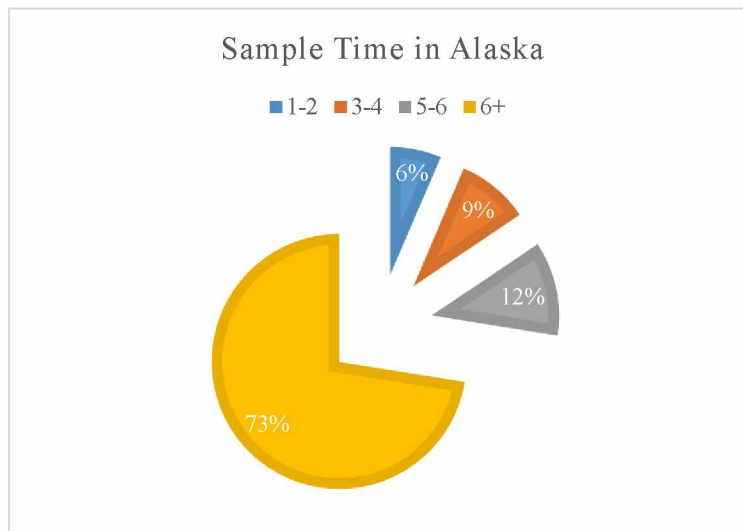


Figure 2 Distribution of participants based on how long they have lived in Alaska

There was also concern in an overestimation of price sensitivity due to the large university student population that made up the participants, however, this seems to have been largely offset by the distribution in household incomes. The actual income distribution for the sample participants is relatively well balanced with a slight skew towards the higher household income ranges, which would be relatively accurate considering Fairbanks' median household income of \$71,068 (U.S. Census Bureau, 2015). The reason for a lower sample median can be

attributed to many university student being in a household with only one member, therefore not being able to combine incomes with anyone. For comparison to show that the bias is not too extreme here, observe that the per capita median income for Fairbanks is \$33,244 (U.S. Census Bureau, 2015).

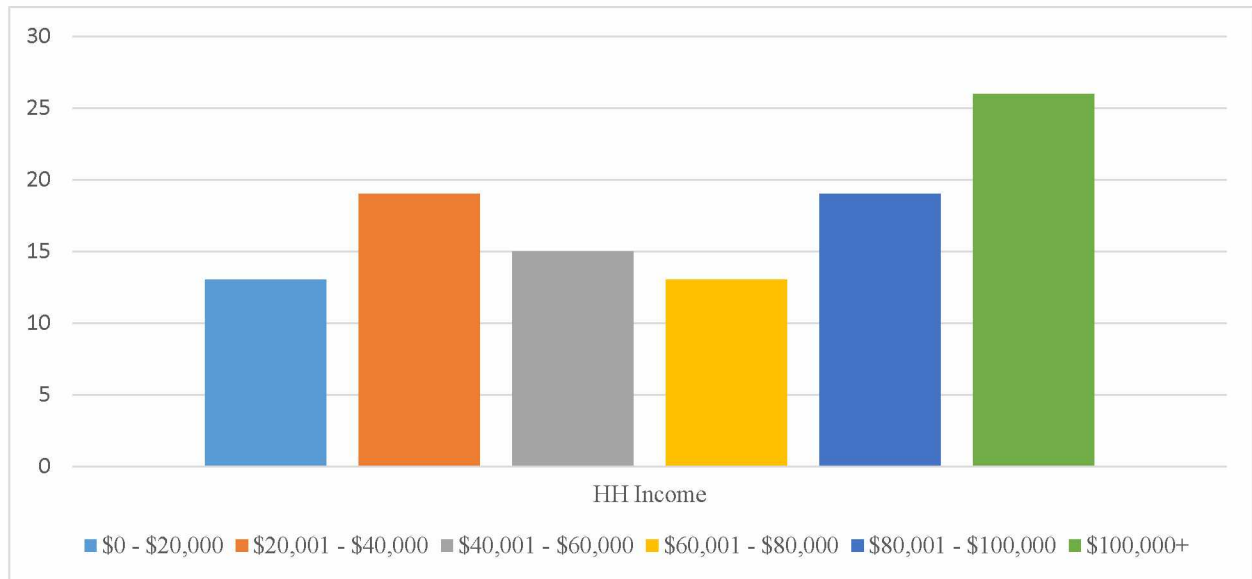


Figure 3 Distribution of household income for survey participants

Chapter 4: Methodology

The Adaptive Choice Based Conjoint (ACBC) was used for the collection and analysis of data, except for the analysis of simple demographic data, which was managed by Stata. With respect to the analysis of the ACBC data and simulations, four primary methods were used: Monotone Regression, Hierarchical Bayesian Regression, Count Analysis, and Market Share Simulations. These primary methods of analysis were estimated using Sawtooth Analysis packages.

Monotone Regression

The monotone regression approach accounts for the relative importance of each observed reindeer meat attribute and the applied respective weightings to each attribute when estimating the overall predictive utility levels. This regression technique assumes monotonicity in each quality correspondent to the monotone change in the continuous variable, price per pound, leading to a linear positive or negative correlation. Since there are no competing goods in the choice experiment, derived elasticities could only be used as a comparative tool within each iteration. The average price sensitivities from each simulated iteration based on each respondents choices were then used to create a point estimate price elasticity of demand that is useful for generating line plots of the respective demand curves, but not useful for fully quantifying price elasticity of demand. The utilities and relative importance of each meat quality were observed to generate a Willingness to Pay for a given reindeer meat basket of attributes.

Since the monotone regression only accounts for individual-level behavior, there are no interaction effects, usually yielding wider confidence intervals and potentially skewed utility values. These skewed utilities also lead to understating the importance of some of the more dominant variables, particularly the importance of price.

Hierarchical Bayesian Regression

The HB regression takes into account that the data can be grouped by demographics and preferences, potentially providing for more accurate estimation. However with minor selection bias, the results may be skewed, so there is benefit to analyzing both the HB results, as well as the monotone results. The HB process accounts for each group being its own group and therefore considers utilities by group in generating point estimators for utility, which are used to calculate willingness to pay. The HB results can be used to generate generating simulation data and normalization of slopes assigned to each market share demand curves generated for each of the individual reindeer meat attributes. The HB regression follows the following form.

$$p(\theta_1, \theta_2, \dots, \theta_n | Q = q, P = \rho) \cdot p(Q = q | \theta_1, \theta_2, \dots, \theta_n, P = \rho) : (\text{Likelihood Estimation})$$
$$\chi p(\theta_1 | \theta_n) p(\theta_2) : (\text{Prior})$$
$$\chi p(\theta_n) : (\text{hyperprior})$$

Where each parameter is the respective grouping of a particular demographic, up to n demographics. The analysis is done with conditional on every possible attribute and group, the prior and hyperpriors, to inform the likelihood for any specific attribute to be preferred. This is repeated for each combination of given demographics, $n!$ times, resulting in $n!$ weightings for the final regressional utility output and importance point estimators. The weightings are then used to scale the coefficients from the general model

Count Analysis

The use of count analysis gives us a simple snapshot of the number of occurrences for each independent quality in a winning tournament. This does not give us interaction or scalar terms, but does show gross dominance or ignorance of any individual quality in consumer decision making.

Importance Levels

We use the individual importance levels and use the sample mean of them to solve for the point estimation of the total average importance level for each quality. This process is done independently for each individual, by quality. These importance levels are crucial and their values will differ slightly between monotone and HB regression types since each will yield different utility levels, altering the value for Equation (1). The formulation for calculating point estimate importance levels for each reindeer meat quality is shown, as follows:

Willingness to Pay Estimator

The estimation process begins by using a point estimator, \bar{U} , for the observed utility of each individual, i , with respect to each reindeer meat quality, q . Note, the “average” utility for any given iteration is estimated as

$$\bar{U}_{bq} = \frac{1}{2} \left(\text{Max} \{U_{bq}\} + \text{Min} \{U_{bq}\} \right) \quad (1)$$

where b is each individual's iteration utility. This midpoint estimation shows the middle of an individual's potential utility range for each iteration. Therefore, the average across individuals for N iterations is

$$\bar{U}_{iq} = \frac{1}{N} \sum_{b=1}^N \frac{1}{2} \left(\text{Max} \{U_{bq}\} + \text{Min} \{U_{bq}\} \right) \quad (2)$$

$$\bar{U}_{iq} = \frac{1}{2N} \sum_{b=1}^N \bar{U}_{bq} \quad (3)$$

Next, the point estimator \bar{U}_{iq} is used to derive the relative importance of each q with respect to each i given our quality of interest, q^* , with respect to all of the other $q \in Q$, where Q is the vector of attributes. Thus,

$$IMP_{iq} = \frac{\bar{U}_{iq^*}}{\sum_{q=1}^Q \bar{U}_{iq}} \quad (4)$$

$$IMP_q = \frac{1}{n} \sum_{i=1}^n IMP_{iq} \quad (5)$$

This gives an estimated average importance, averaged across n individuals. The final major steps begin by establishing a parameter, T to represent the relationship between Price (P) and Utility (U). This is done by taking the estimate average utility range for the price range endpoints. For the ACBC, price was set as a continuous, linear variable where $\$7:50 \leq p \leq \$24:75$. Observe,

$$T = \frac{Max\{P\} - Min\{P\}}{U_{Max\{P\}} - U_{Min\{P\}}} \quad (6)$$

Simply stated, T is the average price level an individual is willing to pay to increase their utility by 1, where utility is an endogenous measure for benefit. This converts our utility, or benefit, measurement into how much a person is willing to pay, based off of their derived utility range for each reindeer meat quality. Since $P \geq 0$ in any transaction and an individual's $WTP \geq 0$ for any good, then we must do a parameter shift of our zero centered utility ranges when using

$$WTP_q = \frac{Max\{P\} - Min\{P\}}{U_{Max\{P\}} - U_{Min\{P\}}} (\bar{U}_q - Min\{U_q\}) \quad (7)$$

$$WTP_q = T (\bar{U}_q - Min\{U_q\}) \quad (8)$$

the T ratio. Therefore, rather than use the measured \bar{U}_q , we set $Min\{U_q\} = 0$ for all $q \in Q$ in order to shift from zero centered to zero based utility ranges. Therefore,

Chapter 5: Data Analysis

Overall, the different statistical methods to analyze the data gave consistent results for relative importance of independent variables. The matching relative results support the presence of preference among the sampled population for certain reindeer meat attributes that significantly affect willingness to pay.

Count Data Analysis

The first set of count of data is used to examine specifically each individual respondent's selection of ideal basket of reindeer meat attributes. The attributes from which the respondents chose were: Native raised, Alaska Grown, organic, lean: fat ratios, and cut of meat.

Table 2 “Build Your Own” preferred count levels of each attribute

BYO Counts	Frequency	Percent
Sample Size	109	100
Native	81	74.31
Not Native	28	25.69
Alaskan	107	98.17
Canadian	2	1.83
Organic	81	74.31
Not Organic	28	25.69
93% Lean	29	26.61
90% Lean	44	40.37
85% Lean	26	23.85
80% Lean	10	9.17
Tenderloin	77	70.64
Flank	32	29.36

The dominant basket of attributes followed the original hypothesized expectation that consumers would choose the higher valued, more premium, options when asked to choose their preference with no limitations or reference to price. The ideal basket of attributes chosen was Alaska Grown, native raised, organic tenderloin that was 90% lean. The one attribute that was overwhelmingly dominant was Alaska Grown. Alaska Grown reindeer meat was preferred by 98.17% of respondents to Canadian grown product, everything else held the same. Furthermore, 74.31% of respondents preferred reindeer meat that was raised produced by Alaska Natives. Organic meat was preferred by 74.31% of the sample respondents. Leanness is the attribute that showed the greatest variation in consumer preferences, with 90% lean being the most commonly preferred choice (40.37), but with 93% and 85% lean also being common choices, 26.21% and 23.85%, respectively. Regarding meat cut, Tenderloin was the overwhelming choice of respondents (70.84%). The tenderloin is typically the choice cut for most people and has a higher premium on it, as reflected in respondent choices.

Examining the count data for the tournament winners provides a clear picture of those attributes that are most resistant to fluctuations in price and therefore have the most inelastic demand. This should translate into a higher willingness to pay. The dominant attributes for tournament winning meat attributes are similar to those that were dominant in the “Build Your Own” count estimation. Alaska Grown products are still highly preferred, independent of price, with 85.19% of winning tournament combinations containing an Alaska Grown product. The results align with what respondents initially preferred before the tournament phase, with an overwhelming preference for Alaska Grown products. However, the preference towards Native produced reindeer meat decreases when compared against other goods on a range of price, though still dominant over non-native products. This indicates that while respondents would

prefer Native produced reindeer meat, they may not be willing to pay much of a premium for that guarantee. Organic preference remains similar as the original “Build Your Own” preference. The distribution of winning combinations that include levels of leanness levels is more diverse, which is expected as consumers may opt for less expensive alternatives when low fat meat becomes too expensive. However, there is an increase between how many people said they preferred flank versus how many times flank cuts were actually chosen, which is intuitively backwards. There is the possibility of unbalanced prices where there were enough scenarios that include a low priced tenderloin that participants switched over.

Table 3 Counts of how many times each attribute was part of a winning set

"Winners"	Frequency	Percent
Sample Size	108	100
Native	69	63.89
Not Native	39	36.11
Alaskan	92	85.19
Canadian	16	14.81
Organic	76	70.37
Not Organic	32	29.63
93% Lean	35	32.41
90% Lean	34	31.48
85% Lean	22	20.37
80% Lean	17	15.74
Tenderloin	82	75.93
Flank	26	24.07

Monotone Regression Analysis

As stated, the monotone regression counts every individual the same and does not take any grouping information into consideration, therefore preserving potential bias. In particular, with an awkward income distribution, there is an understatement in price sensitivity.

Table 4 Average importance of each attribute based on monotonic regression

Attributes (n=109)	Average Importance	Standard Deviation
Price per pound	35.98813	19.36783
Native	9.55728	7.62438
Alaska vs. Canadian	11.17733	8.95468
Organic	13.32359	10.8366
Lean	19.14744	11.50037
Cut	10.80624	8.31229

These importance levels can be interpreted as what percentage of a consumer's decision is affected by each quality. As expected, price per pound is the most dominant quality in a consumer's decision making process, accounting for approximately 36% of the choice when a consumer selects a reindeer meat option. Also expected, the leanness of the meat accounts for 19% and is the second heaviest weighting for determining choice. In general, the monotone regression made for much smaller utility ranges between levels in the respective meat attributes, which can be attributed to each individual attribute being evaluated equally, allowing for the general distribution of price related demographics to be spread out, diminishing the price sensitivity effect.

Hierarchical Bayesian (HB) Regression Analysis

Table 5 Average Importance of each attribute according to HB Analysis

Attribute (n=109)	Average Importance
Price per pound	51.65721**
Native	6.11768*
AKvsCAN	8.74951**
Organic	10.97646**
Lean	14.26553**
Cut	8.23362
Significance Level:	Alpha=.95(*) Alpha=.99(**)

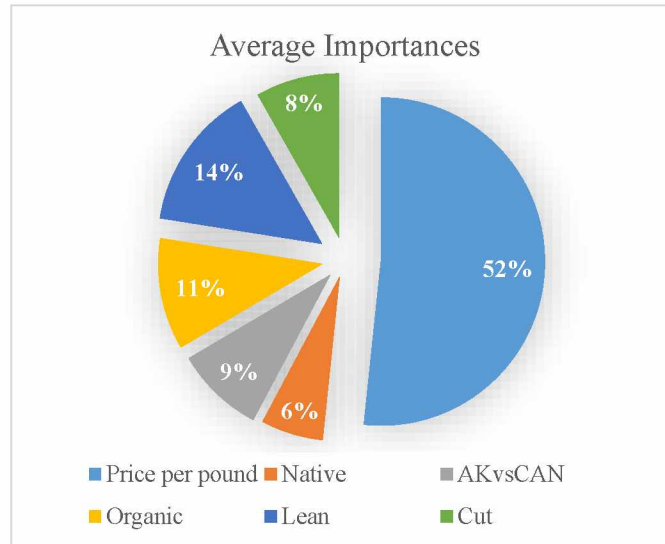


Figure 4 Graphical representation of how important each attribute is to the average respondent

The HB Regression yielded the expected results based on the prior findings with relatively higher significance levels due to the lower standard deviations that result from the hierarchical grouping providing more robust results. Further we observe that the importance of respective attributes are consistent with the preferred attributes identified in the BYO and dominant winning tournament choice counts estimations. Note that price considerations account for over 50% of consumer's choice which is consistent with economic theory, which generally

portray price as being a key factor in consumer demand. The next most influential decision factor is leanness, which is consistent with the results from the monotone analysis. The relative importance of organic products is also consistent with the monotone analysis, being the third most important attribute in the respondents' choices. Alaska Grown, cut of meat, and Native raised reindeer were found to be 4th, 5th, and 6th ranked attribute, respectively. The results show significant variation in level of importance, which is consistent with that of the prior analyses, strengthening our confidence in the validity of the results. A surprising result is that the Alaska Grown attribute, which was overwhelmingly dominant in the count analyses, but garners a relatively low level of utility, diminishing its actual importance in choices compared to other attributes.

Willingness to Pay

Table 6 HB Willingness to pay estimations and utility ranges

Attributes (n=109)	Average Utilities	U Range	WTP
PRICE: 7.5	154.04364	308.08728	
PRICE: 24.75	-154.04364	0	T=0.055991
Native	9.37192	18.74384	\$1.05
Not Native	-9.37192	0	\$ -
Alaskan	25.28889	50.57778	\$2.83**
Canadian	-25.28889	0	\$ -
Organic	28.80846	57.61692	\$3.23**
Not Organic	-28.80846	0	\$ -
Leanness	93%	22.79603	\$1.28*
			\$
	90%	16.99995	51.82746 2.90
	85%	-4.96847	29.85904 \$1.67
	80%	-34.82751	0 \$ -
Tenderloin	20.38969	40.77938	\$2.28
Flank	-20.38969	0	\$ -
NONE	-12.04741	0	\$ -
Significance Level:	Alpha=.95(*) Alpha=.99(**)		

The willingness to pay estimates show the additional amount of money (in USD), an average consumer is willing to pay per pound of reindeer meat for each particular attribute. The ranges are shifted to the right to change from a zero-centered scale, to a zero-minimum scale, allowing us to analyze the price potential for each attribute. This means that minimum utility granting levels have a WTP=\$0 since they are the baseline, thus no additional utility is gained so consumers unwilling to pay for them. Most notably, the average WTP point estimate is at \$3.23, meaning that the average consumer is willing to pay \$3.23 extra to have USDA certified organic reindeer meat. Also, of interest, there is an average \$2.83 increase in willingness to pay for Alaska Grown reindeer meat, rather than Canadian imported reindeer. Although there is only a \$1.05 WTP for Native raised meat, this characteristic would be coupled with Alaskan Grown due to the Reindeer Act. When looking at the highest utility yielding options for each attribute, there is a potential premium of \$12.29/lb. to be gained.

Chapter 6: Conclusion

In this thesis several estimation methods were employed to examine consumer preferences for various reindeer meat attributes. The specific attributes included were price per pound, Alaska Grown, organic, lean content of meat, cut of meat, and whether the meat was native raised. This thesis aimed to estimate willingness to pay for each of these attributes and find dominant attributes amongst these. The goal was achieved through the observation of participant preferences in an adaptive choice based conjoint and using a Hierarchical Bayesian Regression to derive average utility gained from each attribute level. Even though estimation methods yielded different estimates of utility and average importance, there consistency in the results as to the relative importance of each attribute. The relative importance of various attribute from the most important to least important is as follows,

1. Price
2. USDA Certified Organic
3. Lean Percentage of Meat
4. Alaska Grown
5. Cut of Meat
6. Native Raised

The ranking of these attributes have marketing implications, as far as what methods and attributes of reindeer meat producers can focus on to improve ability to sell product, as well as further develop a unique niche market in the Alaskan economy. The willingness to pay statistical construct is effective for point estimation, however a greater sample size and more diversified Alaskan representation would allow for more accurate point estimators for utility parameters, therefore more accurate willingness to pay estimators.

The results of the study show that price is a strong factor in purchasing decisions, but also show that there is a perceived utility gain from different attribute levels in reindeer meat. The strong correlation towards organic and leaner cuts of meat indicate a demand for higher quality meat products. The reindeer meat supply currently has a lot of limitations when it comes to higher quality levels of processing. If there were to be investment into the supply, this study suggests that high quality product would be most appealing to potential consumers. This would require an adjustment in production methods used and would also require investment in a USDA processing facility to certify the organic produce, as well as clear the meat to be sold in commercial markets.

There appears to be a demand for reindeer meat, but it is difficult to tell if the demand would warrant the investment into a supply structure, which would need to be a separate analysis. There is a significant result that people want to see more Alaska Grown products though. Currently, many of our commercially available substitutes to reindeer meat have to be imported and the Alaska Grown aspect of reindeer meat may help solidify a consumer base. There is potential to develop the market which could benefit Alaskan consumers as well as increase the revenue going to areas that have a lot of reindeer farms.

Further Research Opportunities

The reindeer meat market in Alaska is, in many ways, a developing market. Alaska Natives are largely underemployed and living around the poverty level (U.S. Census Bureau, 2010). In some ways, this is not an issue because many Alaska Natives rely on subsistence living, but they are still struggling to participate in the regular economy. An expansion of reindeer meat production for potential commercial sale would help develop the village economies around Alaska. To better inform this study, a widespread survey of Alaska would be

highly beneficial, particularly the more densely populated Anchorage MSA, as well as many of the rural villages, to get a more accurate representation of not only Alaska demographics, but as well as Alaska's economic participants, since Anchorage is the major economic hub for the state. Additionally, response solicitation at local stores, such as co-ops, would prove beneficial in gaining improved response rates. When conducting the survey in the future, it would be ideal to give participants a tasting of different types of reindeer containing various levels of the observed attributes. This would allow for better informed responses and more accurate utility and willingness to pay estimators.

Additionally, an analysis of reindeer supply side costs and focus group choice experiment could prove useful in gaining insight to the supply chain focuses when developing reindeer meat. This can develop a better understanding to how profitable commercial reindeer meat would be, given our existing WTP estimators, as well as what part of the reindeer meat markets could benefit from increased production and marketing efficiency. The additional data would help in determining price elasticity of supply and demand, allowing estimates for growing the developing market.

Bibliography

- Adalja, A., Hanson, J., Towe, C., & Tselepidakis, E. (2015). An Examination of Consumer Willingness to Pay for Local Products. *Agricultural and Resource Economics Review*, 44(03), 253-274.
- Bartlett, L. (2003). Caribou hunting: A guide to Alaska's herds. Fairbanks, AK: Pristine Publishing
- Brown, C. (2003). "Consumers' Preferences for Locally Produced Food: A Study of Southeast Missouri." *American Journal of Alternative Agriculture*. 18(4):213-224
- Bucki, C. (2004). Reindeer Roundup. *Reindeer Research Program, University of Alaska Fairbanks*
- Carpio, Carlos & Isengildina-Massa, O. (2008). "Consumer Willingness to Pay for Locally Grown Products: The Case of South Carolina." *Southern Agricultural Economics Association Annual Meeting, Dallas, TX*.
- Christie, A., & Finstad, G. (2009). *Reindeer in the "Great Land": Alaska's Red Meat Industry. Journal of Agriculture and Food Information* (10):354-373
- Department of Natural Resources, State of Alaska. (2013). Alaska Grown Program. Retrieved from http://dnr.alaska.gov/ag/ag_AKGrown.htm/
- Egels-Zandén, N., & Hansson, N. (2015). Supply Chain Transparency as a Consumer or Corporate Tool: The Case of Nudie Jeans Co. *Journal of Consumer Policy*, 39(4), 377-395.
- Green, P.E., & Srinivasan, V. (1990). "Conjoint Analysis in Marketing: New Developments with Implications for Research and Practice." *Journal of Marketing* 54(4):3-19.
- Griffin, M. R., & Frongillo, E. A. (2003). Experiences and perspectives of farmers from Upstate New York farmers' markets. *Agriculture and Human values*, 20(2), 189-203.
- Henneberry, S.R., Agustini, H.N., Taylor, M., Mutondo, J.E., Whitacre, B. & Roberts, B.W.. (2008). "The Economic Impacts of Direct Produce Marketing: A Case Study of Oklahoma's Farmers' Markets." Paper presented at the SAEA annual meeting, Dallas, TX, 2-6 February.
- Kjell, T., & Hammervoll, T. (2013) Niche marketing research: status and challenges. *Marketing Intelligence & Planning*, Vol. 31 Iss: 3, pp.272 – 285
- Loureiro, M.L., & Hine, S. (2002) 'Discovering Niche Markets: A Comparison of Consumer Willingness to Pay for Local (Colorado Grown), Organic, and GMO-Free Products', *Journal of Agricultural and Applied Economics*, 34(3), pp. 477–487

- Loureiro, M.L., & McCluskey, J. J. (2000). Consumer preferences and willingness to pay for food labeling: A discussion of empirical studies. *Journal of Food Distribution Research*, 34(3), 95-102.
- Louviere, J.J., Flynn, T., & Marley, A.A.J. (2015). *Best-worst Scaling: Theory, Methods and Applications*. Cambridge, UK: Cambridge UP.
- MacMillan, D.C., & Phillip, S. (2010). Can Economic Incentives Resolve Conservation Conflict: The Case of Wild Deer Management and Habitat Conservation in the Scottish Highlands. *Human Ecology*, 38(4), 485-493.
- Martin, S., & Hill, A. (2009). "The Changing Economic Status of Alaska Natives, 1970-2007." Institute of Social and Economic Research. University of Alaska Anchorage.
- Orme, B. "Getting Started with Conjoint Analysis: Strategies for Product Design and Pricing Research." (2010):77-88.
- Reynolds-Allie, K., & Fields, D. (2011). "Alabama Restaurant Preferences and Willingness to Pay for Local Food: A Choice Based Approach." Paper presented at the SAEA annual meeting, Dallas, TX, 2-6 February.
- RRP University of Alaska Fairbanks. (2005). "Reindeer History in Alaska." Reindeer Research Program, University of Alaska Fairbanks.
- Sawtooth Software, Inc. (2014). "The Adaptive Choice Based Conjoint (ACBC) Technical Paper." *Sawtooth Software Technical Paper Series*.
- U.S. Census Bureau. (2010). *Community Facts: Fairbanks, AK*. Retrieved from https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml/
- U.S. Department of Agriculture, National Agricultural Statistics Service, Alaska Field Office. (2008). *Alaska Agricultural Statistics 2008*. Retrieved from http://www.nass.usda.gov/Statistics_by_State/Alaska/Publications/Annual_Statistical_Bulletin/annual2008.pdf

Appendix A IRB Authorization



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Institutional Review Board

909 N Koyukuk Dr. Suite 212, P.O. Box 757270, Fairbanks, Alaska 99775-7270

December 9, 2016

To: Joseph Little, Ph.D.
Principal Investigator
From: University of Alaska Fairbanks IRB
Re: [992073-1] Willingness to Pay for Reindeer Qualities

Thank you for submitting the New Project referenced below. The submission was handled by Exempt Review. The Office of Research Integrity has determined that the proposed research qualifies for exemption from the requirements of 45 CFR 46. This exemption does not waive the researchers' responsibility to adhere to basic ethical principles for the responsible conduct of research and discipline specific professional standards.

Title:	Willingness to Pay for Reindeer Qualities
Received:	November 23, 2016
Exemption Category:	2
Effective Date:	December 9, 2016

This action is included on the December 14, 2016 IRB Agenda.

Prior to making substantive changes to the scope of research, research tools, or personnel involved on the project, please contact the Office of Research Integrity to determine whether or not additional review is required. Additional review is not required for small editorial changes to improve the clarity or readability of the research tools or other documents.

Generated on IRBNet

Appendix B Survey Feedback

The following are some of the relevant comments left as feedback by choice experiment participants that may be useful for further research or policy ideas:

“What are the chances reindeer meat will become commercially available in the near future?”

“I will avoid any product the production of which is restricted to any racial group.”

“Market direct to outside restaurants”

“We would eat more if it was available.”

“...I was more interested in whether or not the meat was from Alaska and raised by Alaska Natives. However, my overall preference is for cheap lean meat. When I was considering low cost meats, I was more concerned with the leanness of the meat and the cut...”

“One of the biggest factors on here is... The option that it 'won't work for me' on your study should have a way to recognize that only the cheapest choice was selected.”

There were multiple comments reinforcing that price is the major factor for a lot of consumer decisions, as well as comments saying that a respondent's real world consumption of reindeer meat would be much greater if it was commercially available to buy at a grocery store. Many people commented that they enjoyed the survey's short length and the ACBC choice layout. Some also commented that there needs to be more research, such as this, done for the local markets, reindeer meat included.

Appendix C Raw Average Utilities

Table 7 Monotone Average Utilities

Average Utilities (Zero-Centered Diffs)	Average Utilities	Standard Deviation
PRICE: 7.5	101.62342	68.68267
PRICE: 24.75	-101.62342	68.68267
Native	9.01256	35.64951
Not Native	-9.01256	35.64951
Alaskan	28.07889	32.56927
Canadian	-28.07889	32.56927
Organic	25.39842	44.92538
Not Organic	-25.39842	44.92538
93%	18.26326	57.28256
90%	12.35602	48.10964
85%	-5.22916	46.79556
80%	-25.39012	54.60611
Tenderloin	17.95344	36.84077
Flank	-17.95344	36.84077
NONE	-92.54235	72.752

Table 8 HB Average Utilities

Average Utilities (Zero-Centered Diffs)	Average Utilities	Standard Deviation
PRICE: 7.5	154.04364	59.4169
PRICE: 24.75	-154.04364	59.4169
Native	9.37192	23.67932
Not Native	-9.37192	23.67932
Alaskan	25.28889	18.36001
Canadian	-25.28889	18.36001
Organic	28.80846	31.19591
Not Organic	-28.80846	31.19591
93%	22.79603	38.26313
90%	16.99995	27.42698
85%	-4.96847	25.89103
80%	-34.82751	47.71081
Tenderloin	20.38969	21.39633
Flank	-20.38969	21.39633
NONE	-12.04741	72.36894

Appendix D Survey Outline

Reindeer Qualities Survey

This survey is part of a project at the University of Alaska Fairbanks. We want to find out what is important when people buy reindeer meat. The survey will ask you to find out how much you know about reindeer. There is also an exercise to narrow down what is important to you. At the end of the survey, some general information will be collected.

Please enter your PIN:

All responses will be kept confidential and will not be associated with your name. Participation in this study is voluntary. In order to participate, you must be 18 years or older.

If you choose to participate, the survey will take about 10 to 15 minutes of your time. The only cost to you is your time.

Are you at least 18 years old and wish to participate?

I agree to take this survey

I do not agree to take this survey

For any questions or concerns about this survey please contact:

Nathaniel Burke
Graduate Student, University of Alaska Fairbanks
(907) 474-5532

or

Dr. Joseph Little
Research Advisor, University of Alaska Fairbanks
(907) 474-2711

The UAF Institutional Review Board (IRB) is a group that examines research projects involving people. This review is done to protect the rights and welfare of people involved the research. If you have questions or concerns about your rights as a research participant, you can contact the UAF Office of Research Integrity at 474-7800 (Fairbanks area) or 1-866-876-7800 (toll-free outside the Fairbanks area) or uaf-irb@alaska.edu.

Overview

This survey is made up of three sections:

I. Background

This section will ask how familiar you are with fish and game meat.

II. Choice Experiment

This exercise lets you pick your favorite options for reindeer meat. The survey will ask about the following subjects:

1. Price per Pound
2. If Alaskan Natives or Canadian aboriginal peoples farmed the reindeer.
3. Alaskan vs Canadian origin
4. Organic or not
5. Lean meat content
6. Cut of the meat

You will then pick what things are "unacceptable" or you "must have" in your meat. Then you will select your favorite options from groups of three.

III. Socio-Demographics

This section will ask your background information.

I. Fish and Game

Instructions

This section will ask how familiar you are with fish and game meat.

You will be asked if you are a vegan, vegetarian, or pescetarian - This is anybody that does not eat meat. For this survey, if the only meat you eat is fish, answer yes.

Section I: Fish and Game

Are you a vegan, vegetarian, or pescetarian?

Yes

No

Have you ever eaten reindeer meat (including reindeer sausage)?

Yes

No

Have you ever eaten caribou meat?

Yes

No

How often have you gone hunting or fishing in the last five years?

Not at all

Rarely (At most, once a year)

Occasionally (A few times a year)

Seasonally (Multiple times within a given season)

Frequently (Regularly, year round)

Hunting/fishing is a main source of my subsistence

Have you ever, raised, herded, or butchered reindeer?

Yes

No

II. Choice Experiment

Instructions

This exercise will let you pick your favorite options for reindeer meat. There are six reindeer meat qualities you will choose for.

1. **Price per Pound** - Prices will range from \$8/lb. to \$24/lb. All money is in US dollars.

2. **Raised by Alaskan Natives/Canadian Aboriginal People** - The reindeer meat comes from a farm or herd that is run by a member of any of the aboriginal peoples of Alaska or Canada. This includes: American Indian, Eskimo, First Nations, Métis, and Aleut peoples.

3. **Alaskan vs. Canadian** - Where the reindeer came from. There are laws that limit who can raise reindeer from Alaska. These laws only let Alaskan natives raise Alaskan reindeer. Anyone can raise Canadian reindeer.

4. **Organic** - Organic food is grown without chemicals. Animals used for meat, poultry, eggs, and dairy products do not take antibiotics or hormones. Organic is also known as "all-natural."

5. **Lean** - The amount of lean meat vs. fat. For example: 85% lean and 15% fat. Lean meat is healthier, while fatty meat is juicier.

6. **Cut** - There will be three cuts of meat, varying in tenderness.

- Tenderloin (More tender cut)
- Back ribs (Typically slow cooked or smoked)
- Flank (Usually used in stews or slow cooked steaks)

These cuts of meat are similar to the same cuts of beef or venison.


The exercise is in three major parts.

Part 1 You will "build your own" product. You will pick your favorite option for each of the qualities listed, except price.

Part 2 On each page, there will be three options for reindeer meat. You will mark each option as "a possibility" or "won't work for me." The survey will figure out what you "must have" or what is "unacceptable." The survey will then ask about these.

Part 3 You will see three reindeer meat options at a time. You will pick your favorite from each set. The sets will be based on your answers from Part 1 and Part 2. Some things will be grayed out. The grayed out parts mean that thing is the same in all three options.

Please select the reindeer meat you'd be most likely to purchase. For each feature, select your preferred level.

Feature	Select Feature
Raised by Alaskan Natives/Canadian First Nations, Inuit, or Métis	<input type="checkbox"/> Yes <input type="checkbox"/> No
Alaskan or Canadian origin	<input type="checkbox"/> Alaskan <input type="checkbox"/> Canadian
Organic meat	<input type="checkbox"/> Yes <input type="checkbox"/> No
Percentage of lean meat	<input type="checkbox"/> 93% <input type="checkbox"/> 90% <input type="checkbox"/> 85% <input type="checkbox"/> 80%
Cut of Meat	<div>  </div> <input type="checkbox"/> Tenderloin






Flank

Next

Here are a few options you might like. For each one, pick whether it is a possibility or not.

(1 of 6)

Price per pound	\$20	\$13	\$21
Raised by Alaskan Natives/ Canadian First Nations, Inuit, or Métis	No	Yes	Yes
Alaskan or Canadian origin	Alaskan	Canadian	Alaskan
Organic meat	Yes	Yes	Yes
Percentage of lean meat	90%	85%	93%
Cut of Meat	Tenderloin	Tenderloin	Tenderloin
			

	<div> <div>A possibility</div> <div>Won't work for me</div> </div>	<div> <div>A possibility</div> <div>Won't work for me</div> </div>	
<div>Next</div>			

The survey will have participants go through multiple rounds of these options, using the same format.

We've noticed that you've avoided reindeer with certain options shown below. Would any of these features be **totally unacceptable**? If so, mark the **one feature that is most unacceptable**, so we can just focus on reindeer that meets your needs.

Percentage of lean meat - 80%

None of these is totally unacceptable.

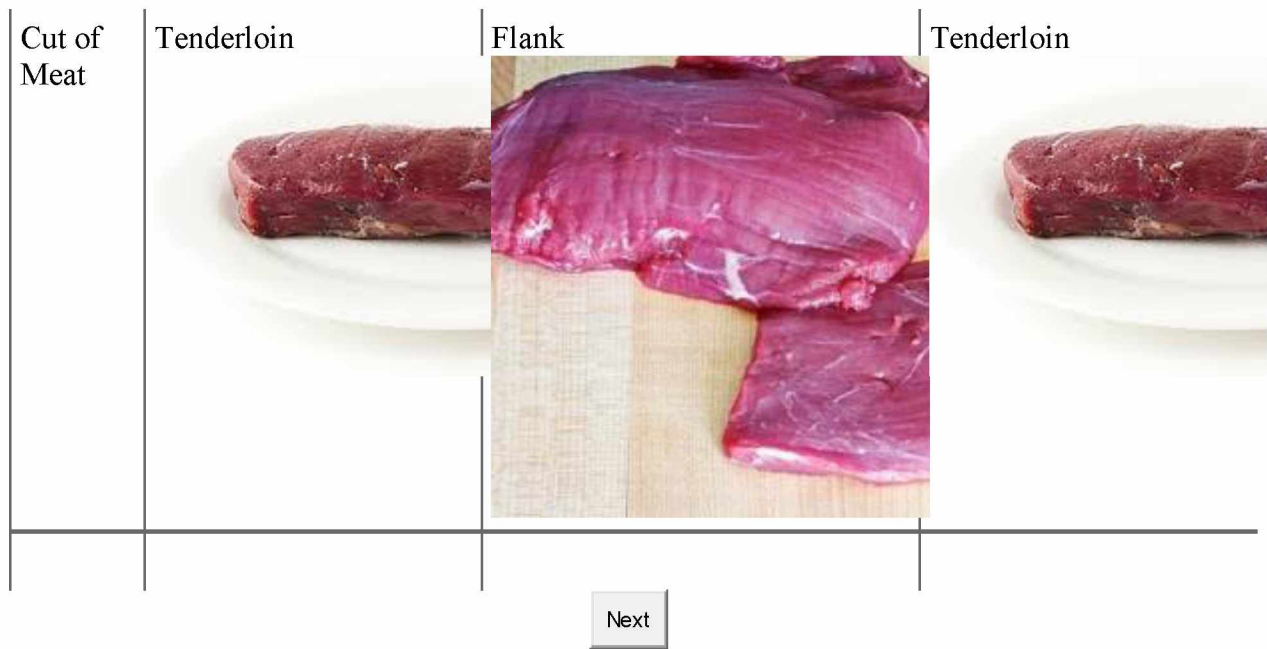
Next

*If a respondent is avoiding a certain trait, they will be asked if it is unacceptable

Among these three, which is the best option? (I've grayed out anything that is the same.) *Respondents will go through multiple rounds of choices to make

(1 of 6)

Price per pound	\$15	\$22	\$8
Raised by Alaskan Natives/ Canadian First Nations, Inuit, or Métis	Yes	Yes	Yes
Alaskan or Canadian origin	Alaskan	Alaskan	Alaskan
Organic meat	Yes	Yes	No
Percentage of lean meat	85%	90%	85%



III. Socio-Demographics

This section will collect some basic information. All responses given will be kept confidential and not associated with your name. Answering these questions is completely voluntary.

The following terms are defined to help you answer the questions.

- Military Household** - One of the members of your household is an active duty military service member. (Army, Navy, Air Force, Marine Corps, or Coast Guard).
- University of Alaska Student** - Registered at least half time (6 credits) at the University of Alaska. This includes online courses.
- Alaskan Native** - A member or descendant of any of the aboriginal peoples of Alaska, including American Indian, Eskimo, and Aleut people.

Socio-Demographics

What is your sex?

Male

Female

How old are you?

18-24

25-34

35-44

45-54

55-64

65 or older

How many people are in your household, including yourself?

1

2

3

4

5

6 or More

What is your annual household income?

\$0 - \$20,000

\$20,001 - \$40,000

\$40,001 - \$60,000

\$60,001 - \$80,000

\$80,001 - \$100,000

\$100,000+

Socio-Demographics

Were you born in Alaska?

Yes

No

How many years have you lived in Alaska?

1-2

2-4

4-6

6+

Do you intend to permanently stay in Alaska?

Yes

No

Not sure

Are you a member of an active duty military household?

Yes

No

Are you a student at the University of Alaska?

Yes, Undergraduate Student

Yes, Graduate Student

No

Are you an Alaskan Native?

Yes

No

Are you a descendant of the Canadian First Nations, Inuit, or Métis peoples?

Yes

No

Review and Feedback

You are almost done. Please type any comments or feedback you have.

Next

Thank you

You have reached the end of the survey, thank you for your participation.